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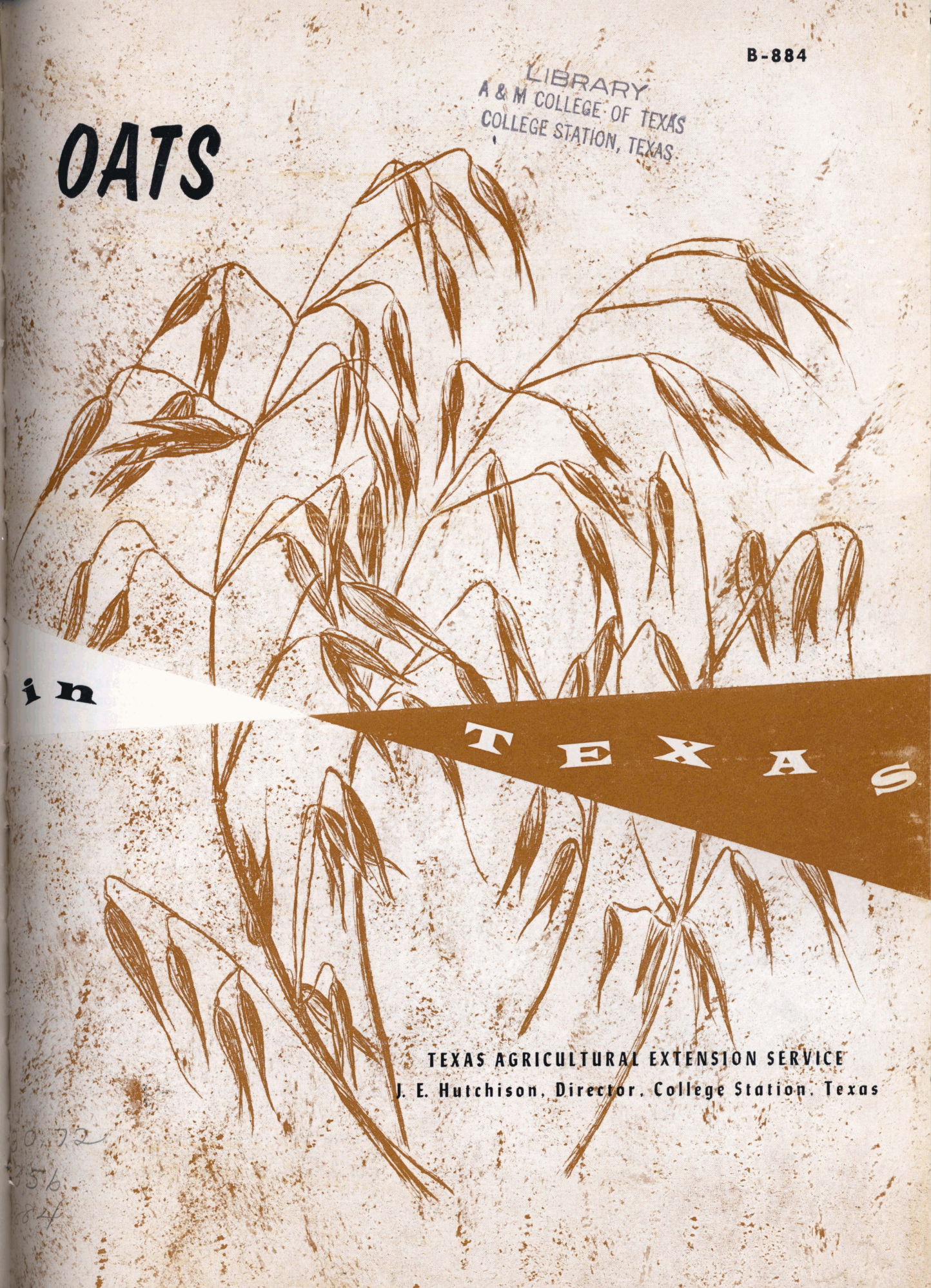
OATS



in TEXAS

TEXAS AGRICULTURAL EXTENSION SERVICE
J. E. Hutchison, Director, College Station, Texas

Contents

Oats in Texas

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OATS ARE GROWN IN TEXAS for grain, grazing, hay and silage or for various combinations of these uses. The estimated income per year to Texas farmers from oats from 1944 to 1955 was 35 million dollars. During this period the average yield per acre was 21.5 bushels. The average acreage harvested for grain each year during this period was 1,313,000 acres. Texas county agents estimated 1 million acres were seeded for forage purposes in 1956. The acreage seeded to oats varies each year depending on conditions at planting time. The only other grain crops grown on a larger acreage each year are corn, wheat and grain sorghum.

WHERE THEY GROW

Oats are grown primarily for grain in Area 1 (figure 1), but wheat is more profitable in this area because of its greater cold resistance. In Area 2, oats are grown primarily for grain, but most fields also are grazed. Approximately 10 percent of the oat acreage in Texas is in this region. In the western half of Areas 3 and 4, oats are sown for both grain and grazing. Large acreages often are planted in these two areas if fall rainfall is ample. In the eastern half of Area 3 oats are grown primarily for grain production. In Areas 5, 6 and 7 nearly all oats are sown for winter pasture, and the grain crop is secondary. Most fields are grazed until all plants are killed.

Approximately 95 percent of the oats grown in Texas is fed to livestock or used for seed and 5 percent is used for industrial purposes. Large quantities of oats often are shipped to other southern states since plant diseases limit grain production in these areas and they depend on commercial growing areas for seed.

High relative humidity, followed by heavy outbreaks of diseases, seriously limits oat production in certain parts of Texas. When the humidity is high, diseases develop rapidly and may prevent small grain from producing grain. Humidity frequently is high during the spring months in Area 5. The production of grain is hazardous in this area, even when the most rust-resistant varieties are grown.

Temperature frequently limits oat production in Texas. Oats seldom are grown on the High Plains because of low temperatures during the winter. High temperatures during late May and early June occasionally decrease yields in an area approximately from Wichita Falls to El Paso. Even under irrigation yields of oats are low in the Trans-Pecos area.

Periods of drouth curtail oat production in parts of Texas each year. Large acreages of oats would be planted in the western half of Areas 3 and 4 and the southern half of Area 2 if favorable conditions for planting existed in the fall. Moisture is seriously limited in these areas approximately 3 out of 5 years.

Low fertility and poor soil structure often prevent high oat yields in East and South Texas. This is true especially in the deep sandy soils of East Texas. Oats do best in deep, fertile, well-drained loam and clay soils.

CULTURAL PRACTICES

Seedbed Preparation

In areas where moisture consistently limits the production of grain, it is important that a good seedbed be prepared early in the season. When oats are sown in a rotation following other small grains, the soil should be plowed

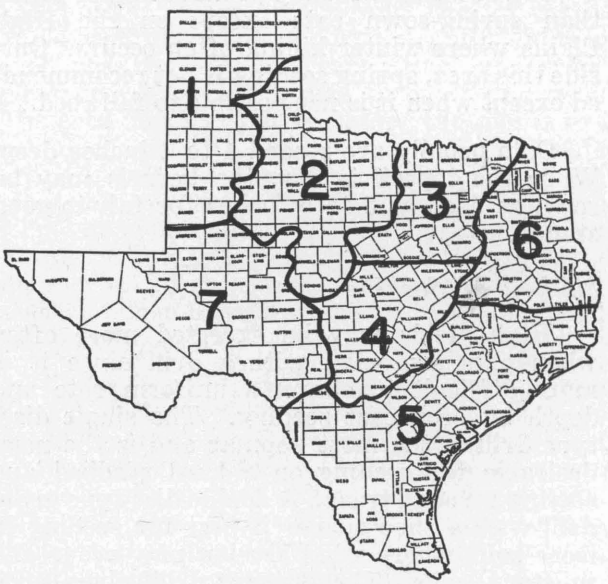


Fig. 1. Texas is divided into environmental areas for the purpose of testing oats.

Fig. 2. Oats frequently are sown in fields where cotton was the previous crop.

with a disc or moldboard plow as soon after harvest as possible. The soil then should be disc-harrowed when necessary for the control of weeds and a firm seedbed maintained. If oats follow cotton, the land usually is cultivated with a disc harrow and then with a spike-toothed harrow to level the seedbed. The stalks may be cut or shredded during the winter or spring. When oats follow corn or grain sorghum, the land should be tilled with a disc or moldboard plow in the same manner as when oats follow small grain. In Northwest Texas, the soil surface frequently is left rough or trashy during the winter to reduce wind erosion.

Date, Rate and Depth of Seeding

Fall-sown oats usually produce higher yields than spring-sown oats except on the High Plains where winter killing often occurs. Outside this area, spring seeding is not recommended except when it is not possible to fall seed.

Oats usually are seeded 1 to 2 inches deep. When the topsoil is dry, the kernels may be sown as deep as 3 to 5 inches for fair-to-good stands.

Method of Seeding

High yields may be expected more often when oats are sown with a drill since it is more difficult to obtain a uniform rate and depth by broadcast seeding. The single disc-type drill is the most popular and is the most desirable for seeding on a hard seedbed and cutting through trash. A double disc-type grain drill with a shoe opener is best for seeding in loose soils where wind erosion may occur and in stony soils. The furrow drill gives good results when it is necessary to place seed deep in a moist soil. This drill leaves a furrow which may hold snow and reduce winter killing and wind erosion.

Seed Treatment

Ceresan M, Ceresan M-2X or Panogen are recommended seed treatments for the control of most oats diseases. The value of seed treatment may not be apparent in some years while in others it may mean the difference between a poor and a good crop. The cost of the fungicide for treating oats is approximately 4 cents per bushel and the returns may be worth many times the cost. Seed treatment aids in controlling seed decay and seedling blights, both types of smuts and Helminthosporium blight. The Mustang variety is highly susceptible to smut and should be treated, especially if smut was observed the previous year. Since an overdose of the fungicide may seriously lower seed germination, the recommendations of the manufacturer should be followed closely.

An insecticide also may be needed if the seed are sown in fields where large quantities of organic matter have been turned under recently. Wireworms and other soil insects usually are more numerous under these conditions. Good control of soil-borne insects may be expected from the use of 2 ounces of actual dieldrin, lindane or heptachlor to 100 pounds of seed. The application of these insecticides is discussed in Extension Service Leaflet 261, Guide for Controlling Insects on Corn, Sorghum, Small Grains and Grasses.

Fertilization

In most areas where oats are grown, maximum yields of grain and forage cannot be expected unless fertilizer is used along with good management practices. Some soils are low in nitrogen and phosphorus and more damage from winter killing may be expected under

Table 1. Optimum Dates and Rates of Seeding Oats

Area	Fall		Spring	
	Date	Bushels per acre (1)	Date	Bushels per acre
1	Not recommended		Mar. 1	1
2	Oct. 1	1½	Feb. 1	2
3	Oct. 1-15	2-2½ (2)	Feb. 1	3
4 Western	Oct. 15	2	Jan. 15	2½
4 Eastern	Oct. 15	2½	Not recommended	
5	Oct. 15-Nov. 15	2-2½ (2)	Not recommended	
6	Oct. 15	2½	Jan. 15	3
7	Oct. 1-15 (3)	2½	Not recommended	

(1) Use at least 2½ bushels per acre under irrigation.
(2) Heavier rate should be sown on the eastern side of this area.
(3) Recommended in this area only under irrigation.

Fig. 3. The plant on the left has covered smut; the plant in the center is a normal plant; and the one on the right has loose smut. Both smuts are controlled by seed treatment.

these conditions than if adequate quantities of these nutrients are present. However, winter injury may be more severe where an abnormally high amount of nitrogen causes an unusually lush growth. Soil tests should be made and fertilizer added if needed. County agricultural agents can furnish information on how to make a soil test.

Irrigation

Small acreages of oats are grown under irrigation in Texas. In general, farmers have not found it highly profitable to produce this crop under irrigation. The land should be irrigated before planting if irrigation is necessary to insure a stand. Irrigation after planting may produce a crust which prevents the young plants from emerging. Oats usually are sprinkle-irrigated, but some fields are flooded from ditches. Higher seeding rates and larger quantities of fertilizer should be used under irrigation. Anhydrous ammonia may be applied in the irrigation water, if desired.

Oats use the greatest amount of water between the jointing and heading stages or while the plants are growing rapidly. If there is a shortage of irrigation water or enough for only one irrigation, it should be applied during this period.

Weed Control

Johnsongrass, wild oats, goat grass, chess or cheat, darnell and broad-leaved weeds occasionally are a serious problem in the production of oats.

Farmers who seed oats year after year on the same field often prefer Johnsongrass for grazing and do not attempt to destroy it even though this grass is a very serious pest in cultivated fields. Economical control of Johnsongrass by spotoiling is one of the more important research contributions of recent years, and information on this practice may be obtained in Extension Service Bulletin 808 Spotoiling Johnsongrass or from your county agricultural agent.

Wild oats often are a serious problem in oat-growing areas. Plants and seed of this weed are similar in appearance to cultivated oats. (See Figure 2.) True wild oat seed are hairy, shatter readily and have a long, black twisted awn. False wild oats and hybrids with cultivated oats may be white and free of awns. Some seed may remain dormant and volunteer each year for several years. Rust and other plant diseases often spread through wild oats. The seed usually shatter before the plants are combined. Once a field is infested, wild oats are difficult to eliminate. Fields which are planted in row crops for 3 years may still have wild oats volunteering. The best known method of eradication is a rotation of row crops for a number of years, careful selection of planting seed and then careful rogueing to remove wild oat plants.

Chess or cheat, goat grass and darnell may become serious weeds in areas where farmers produce oats year after year in the same field or when seed containing these weeds are sown. These weeds mature at the same time as oats. Like wild oats, they often are a more serious problem than the farmer realizes and a good rotation aids in controlling them.

Curled dock, bracted plantain, buckhorn plantain and other broad-leaved weeds may be

Fig. 4. Wild oats frequently grow along roadsides. The plants are very attractive; however, they are producers of rust, the seed shatter before they can be harvested and volunteer plants come up for many years once the field has been infested.

eradicated with 2,4-D applied at the rate of ½ pound per acre in 20 gallons of water. Oats are more susceptible than wheat or barley to injury from 2,4-D and some varieties are more susceptible than others. Oats should be treated during the latter part of the five-leaf to early boot stage. The plants should be fully tillered (4 to 8 inches tall but not forming joints and stems). Serious injury may result from treatments too early or if treatment occurs after plants have started to joint. Tractor wheels cause serious injury if the plants are 8 inches or more in height. These weed sprays are toxic to many plants and the surrounding vegetation should first be checked for susceptibility to 2,4-D.

VARIETIES

New Nortex or other red rustproof varieties of oats are favored by Texas farmers for grain production. Varieties with gray, black or yellow kernels seldom are as popular as New Nortex. New Nortex is resistant to Helminthosporium blight but has been susceptible to more races of leaf rust than the newer varieties. New Nortex will be damaged by winter killing in approximately 1 year in 6 in Areas 2 and 3. If there is a surplus of grain in Texas, it may bring a premium over Mustang because of the preference by feed manufacturers for grain with red kernels.

Mustang was released in 1948. Large acreages are sown in Areas 2 and 3. It has greater resistance to cold than New Nortex. In 1953 most plants of New Nortex in the area east of Denton and north of Fort Worth and Dallas were killed by low temperatures while Mustang survived without serious injury. Prior to 1957, Mustang was resistant to more different races of crown (leaf) rust than New Nortex. Mustang produces about the same yields as New Nortex unless winter killing or diseases occur. With more resistance to rust and cold, this variety has produced higher yields than New Nortex in experimental tests. However, in 1957 a new race of rust damaged Mustang more seriously than New Nortex. Prior to 1957, Helminthosporium blight seldom was a serious problem with New Nortex, but during the rainy spring of 1957 it reduced yields in the grain-producing areas of the State. The kernels of Mustang are gray or blackish gray under some conditions. Feed manufacturers occasionally hesitate to buy grain of Mustang because it appears weather stained. Actually, Mustang is lower in fibre and higher in oil than New Nortex, making it higher in food value. Mustang stands well for combining but it has been criticized for its shattering under some conditions. This variety is slightly earlier in maturity than New Nortex, but in some cases Mustang will not produce as much early grazing as New Nortex. However, Mustang is a popular variety for grazing purposes in all areas of Texas and also is recommended highly in several Southern States for grazing.

Alamo is the most rust resistant variety adapted to Texas conditions. It is recommended over other varieties for South Texas when oats are grown only for grain. It is highly susceptible to Helminthosporium blight and should not be planted in heavy soils of this region especially if oats grew there the previous year. The plants are early maturing and upright in growth. Alamo probably furnishes earlier grazing in South Texas than any oat varieties commonly grown there. Care should be exercised in grazing Alamo or livestock will graze it to the ground and reduce stands. Alamo produces a plump red kernel without an awn. The seed

Fig. 5. Bronco and Mustang are considerably more resistant to winter killing than New Nortex. This winter killing occurred at the Iowa Park Experiment Station in 1951.

are more attractive than New Nortex or Mustang. Alamo should not be grown on land that was planted in oats the previous year especially in Area 5, (figure 1) since Helminthosporium blight may be a serious problem. Alamo does not furnish as much grazing as Mustang after late February in Area 5. It is a good variety for spring planting in the grain-producing areas of Texas since it is very rust resistant and matures early. However, it often winter kills if fall planted north of Temple.

Bronco is a new oat variety recently released by the Texas Agricultural Experiment Station and the U. S. Department of Agriculture. Foundation seed were released to certified seed growers in 1956. It is very winter hardy and has a red, awnless kernel. The variety originated from the same cross as Mustang and has many Mustang characteristics. However, Bronco is later maturing, has red grain, is more winter hardy, produces less grazing during the colder months and produces more tillers under ideal growing conditions. It is adapted to many states and in experimental tests it has produced as much or more than other varieties in Areas 1, 2, 3 and 4. Because it matures much later than the other varieties, rust may reduce yields seriously in some years, especially in Areas 4 and 5. Rains are frequent in Texas during May and Bronco often may produce higher yields than the other varieties because it can take advantage of the late rainfall. On the other hand, this makes it more likely to rust. It is not recommended for early grazing in South Texas but it probably furnishes more forage late in the season in that area than any other variety.

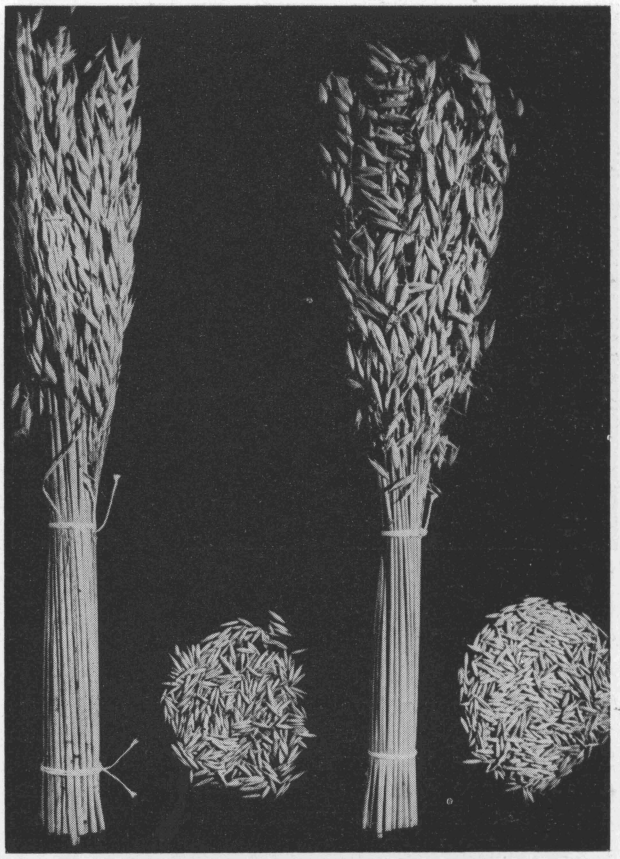
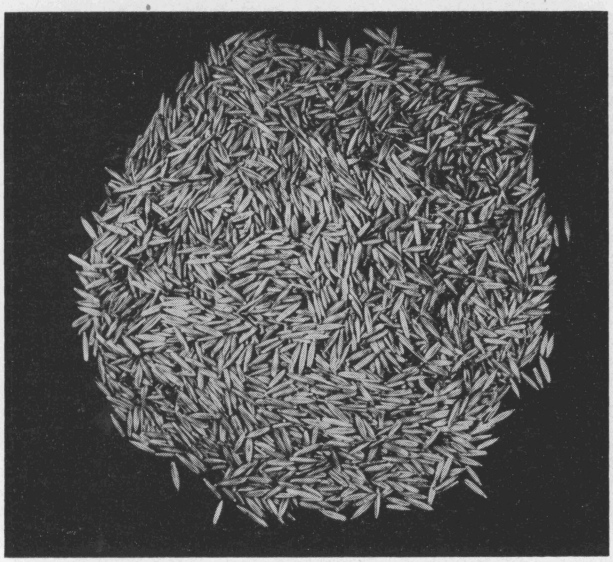


Fig. 6. There was a severe rust attack in the field where these samples were taken. Alamo, right, was resistant to rust; Fultex, left, was susceptible. Note the rust pustules (spots) on the stems of the Fultex plants and the difference in grain produced by the two oat varieties.

Table 2. **Varieties of Oats Recommended or Acceptable**

		RECOMMENDED		ACCEPTABLE	
		Fall sown	Spring sown	Fall sown	Spring sown
Area 1	Panhandle[1]	Bronco Mustang	Alamo	Cimarron Wintok	Fultex Mustang New Nortex
Area 2	Rolling Plains	Bronco Mustang	Alamo	New Nortex Fultex	Fultex Mustang New Nortex
Area 3	North Central	Mustang Bronco New Nortex	Alamo		Mustang New Nortex
Area 4	Central Texas	Mustang Alamo	Alamo	Bronco New Nortex Victorgrain Alber Ranger	
Area 5	South Texas	Alamo	Alamo	Mustang Ranger Alber Camellia Victorgrain	

[1] Fall seeding hazardous. Oat production usually not economical in relation to other crops in this area.



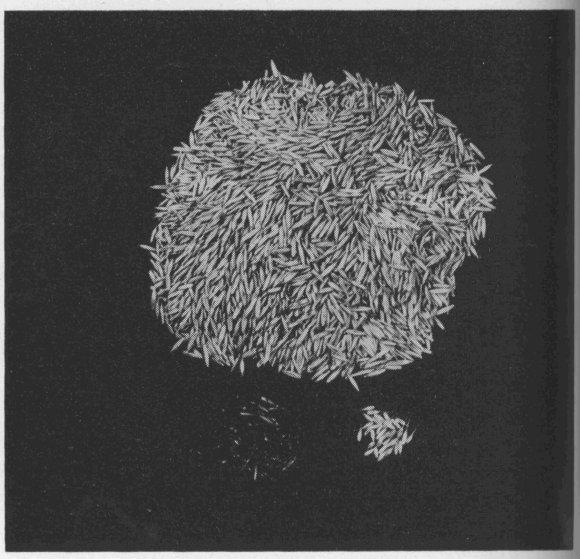


Fig. 7 and 8. The two-pound sample of red rust-proof oats on the left has large, plump kernels and appears to be good planting seed. On the right, this is same sample of planting seed but the wild oats and Darnel seeds have been separated. A farmer would seriously contaminate his farm by planting this sample.

Many other oat varieties in addition to Mustang, New Nortex and Alamo are planted in South Texas for grazing. Some of the more common are Victorgrain, Fulgrain, Camellia, Alber and Traveler. In general, seed of these varieties are shipped in from other states. They are more susceptible to leaf and stem rust than Alamo and Mustang, but several are resistant to Helminthosporium blight. They usually furnish slightly earlier grazing than Mustang, but not as early as Alamo.

SELECTION OF SEED

Once an oat variety consistently produces uniform plants and kernels it should reproduce similar plants and kernels unless its seed become mixed mechanically or it is planted on land where other varieties have volunteered. It is difficult to clean a drill and combine and prevent mechanical mixtures. Since wild oats may volunteer for a number of years even on cultivated land they frequently are a source of

Table 3. Variety Characteristics

			LEAF RUST		STEM RUST		OATS			
Variety	Maturity	Cold tolerance	Common races	Races 213 & 216	Common races	Race 7A	Reaction to H. blight	Kernel color	Awns	Seedling growth
Alamo	Early	Low	R[1]	S	R	S	VS	Red	Few	U[2]
Alber	Late	Med.	R	MR	S	S	R	Red	Many	I
Arkwin	Mid season	High	S	S	S	S	R	Red	Few	P
Camellia	Mid season	Low	MR	S	S	S	R	Red	Many	I
Cimarron	Early	High	S	S	S	S	R	Gray-yellow	Few	I
Fulgrain	Early	Low	R	S	S	S	VS	Red	Very few	U
Fultex	Early	Med.	R	S	S	S	VS	Red	Many	I
Fulwin	Late	High	S	S	S	S	R	Red	Few	VP
Frazier	Early	Med.	S	S	S	S	R	Red	Many	I
Mustang	Early	High	R	S	S	S	MR	Gray	Few	P
New Nortex	Late	Med.	S	S	S	S	R	Red	Many	P
Ranger	Med.	Med.	R	S	S	S	VS	Red	Many	I
Rustler	Early	Med.	R	S	S	S	VS	Red	Many	I
Stanton	Mid season	High	R	S	S	S	VS	Yellow	Few	P
Traveler	Late	High	R	S	S	S	VS	Red	Many	P
Victorgrain	Early	Med.	R	S	S	S	VS	Light-red	Very few	I

[1]R—resistant, MR—moderately resistant, S—susceptible and VS—very susceptible
[2]U—upright, P—prostrate, I—intermediate and VP—very prostrate

contamination. Unless a farmer knows how to produce certified seed and follows the recommended procedure, it is unlikely that he will maintain pure seed longer than 3 to 5 years. If new seed are purchased, it usually is economical to purchase certified seed. In general, certified seed are considerably more true to the variety than noncertified seed.

GRAZING OATS

The grazing of oats under careful management does not necessarily reduce the yield of grain. In fact, controlled grazing may be beneficial if oats become rank. Moderate grazing is recommended but close grazing may make oats more subject to cold injury and reduce yield. The upright growing varieties, such as Alamo, are more easily overgrazed than the prostrate varieties, such as Mustang and Bronco. While upright types usually produce early grazing, grazing through the winter may not be sustained. Upright varieties give best results if allowed to reach a height of 8 inches before being grazed. Poor results may be obtained if upright varieties are grazed closer than 4 inches.

As the top growth of a plant increases, more food is manufactured in the leaves and more nutrients are available for root growth. As the root system expands more food in turn is made available for top growth and the cycle repeats itself. Thus, overgrazing seriously reduces the top and root growth of a plant and restricts the yield. Late grazing usually reduces yield. In general, oats should not be grazed after February 20 in Area 4 (figure 1.); February 28 in Area 3; March 5 in Area 2 and March 10 in Area 1. Early-maturing varieties should not be grazed as late in the season as the late-maturing varieties.

Livestock usually prefer oats over barley for grazing and should not have access to an oat and barley pasture at the same time. Rotation grazing is more profitable than continuous grazing. Damage to plants is less when rotation grazing is practiced.

Fig. 9. Oats provide large quantities of high-quality forage for grazing and can be used also for hay and silage.

OATS IN ROTATION

In North or Central Texas, oats may follow corn or cotton or nearly any other crop grown in the area in a rotation. Corn matures early enough for the preparation of a good seedbed for oats. Cotton land provides an inexpensive seedbed for oats. Volunteer oats and weeds may be a problem if oats follow other small grain or themselves. If oats follow oats, seedling diseases, Helminthosporium blight and winter grain mites may reduce yields seriously. Oats should not follow sorghum in North Central Texas unless fertilizer is applied at seeding time. Sorghum residue decays slowly in the winter, and oats seeded on the land during this period may suffer from a lack of available nitrogen. Oats frequently are fall seeded with sweetclover south of Waco; but north of this area, sweetclover usually is seeded with oats in early February. Oats and biennial sweetclover varieties frequently are spring sown together in North Texas.

DISEASES

The reaction of oat varieties to rust is shown in Table 3 under "variety characteristics." Rust limits grain production in Area 5 (figure 1) and only resistant varieties will produce grain. Others often are killed in the seedling stage. North and west of Area 5, rust causes damage less often, but may be serious 1 year in 5 or 6. In these instances, damage ranges from traces to complete loss. Oats are attacked by both stem and crown (leaf) rust. In the seedling stages in South Texas both rusts attack the crop, but in the spring leaf rust attacks the leaves and stem rust attacks both leaves and stems. Spores are microscopic in size and their number may increase rapidly if the temperature and humidity are fairly high. The disease appears as a small reddish or orange dot (pustule) formed on the plants which may be smaller than the head of a pin or large as the head of a match. Millions of spores may be present in one small pustule. The disease usually overwinters on oats in South Texas and Mexico where the temperature is seldom freezing. The disease moves northward as the crop develops, eventually moving into Canada. North winds carry the spores back in the fall. There are many known races of leaf and stem rust. Some oat varieties are susceptible to all races while others are resistant to one or more. Alamo is resistant to most races, but it is susceptible to race 7A of stem rust and race 216 of crown rust. These

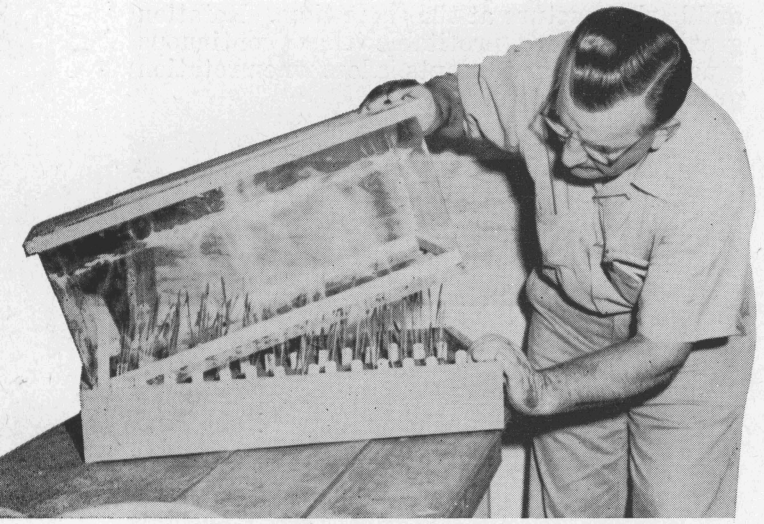


Fig. 10. Several strains of oats are being grown inside this cage which houses many greenbugs. The plant breeder rates the resistant plants for further observation and discards the most susceptible plants.

races recently have been found in Texas. As new races of rust develop, there is no assurance a resistant variety will remain resistant. There is no practical control for rust except the use of resistant varieties.

Helminthosporium blight produces reactions on oat plants similar to that of root rot on other crops. It is a soil and seed-borne disease and is very serious in the heavy clay or river bottom soils of South Texas. The seedlings are attacked as the seed germinate. Plants that escape early infection may show symptoms in the later stages of growth when orange or brown discolored lesions or streaks appear on the leaves. The nodes or joints of the stem darken and weaken so that many plants break over. Other plants are attacked at the crown and become so weak that lodging occurs at the ground level. The roots may become badly discolored or dead. The fungus that causes the disease is spread by infected seed, but it probably is present in most soils and increases rapidly when susceptible varieties are planted. New Nortex and Bronco are resistant to Helminthosporium blight and Mustang is moderately resistant. Alamo is highly susceptible. The disease may be controlled by growing resistant varieties and practicing crop rotation and seed treatment.

Smut, both loose and covered, attacks oat plants and destroys the head. Smuts are controlled easily by seed treatment with the fungicides discussed earlier. Directions for applying seed treatments usually are on the label of each container and should be followed carefully. The Mustang variety is especially susceptible to smuts and the disease often builds up rapidly in 2 or 3 years if the seed are not treated.

INSECTS

Greenbugs may reduce seriously the yield of oats. In 1942, the small grain loss in Texas and Oklahoma was an estimated 61 million bushels valued at 38 million dollars. The development of wheat and barley varieties resistant to greenbugs are being attempted by the Texas Agricultural Experiment Station and U. S. Department of Agriculture. These agencies also are screening the 5,000 known oat varieties in the world, but so far the results do not appear promising. These insects may be controlled with certain insecticides, but control is not always economical.

Winter grain mites are serious pests of oats in Texas where continuous cropping is practiced. Infested fields appear silvery. If oats do not follow oats, this mite usually is not a problem. Damaging infestations can be controlled with certain chemicals.

Grasshoppers frequently damage oats. Their hatching beds are along fence rows, roadsides, field margins and in idle land. Insecticides should be applied to these hatching areas before the grasshoppers move into the oats.

Armyworms and cutworms cause serious damage to oats especially during a cool, wet spring.

Caution: All insecticides are poisonous and precautions on the labels should be followed. Consult your county agricultural agent or a trained entomologist before using them. See Extension Service Leaflet 261.

Tolerance for residues of insecticides on oats have been set by the Pure Food and Drug Administration. Consequently, a certain number of days must elapse between the time of application and harvest. These regulations are

Fig. 11. Helminthosporium blight has seriously damaged the oats which are shown in the center and right of this picture.

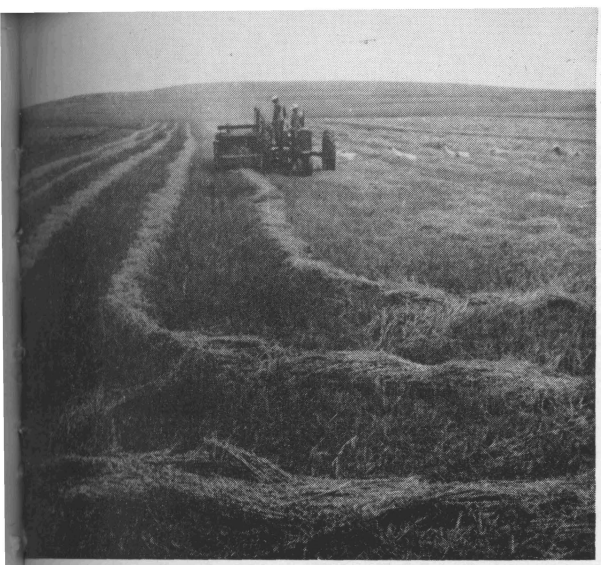


Fig. 12. This field has been windrowed and the grain is being harvested by a combine with a pickup attachment.

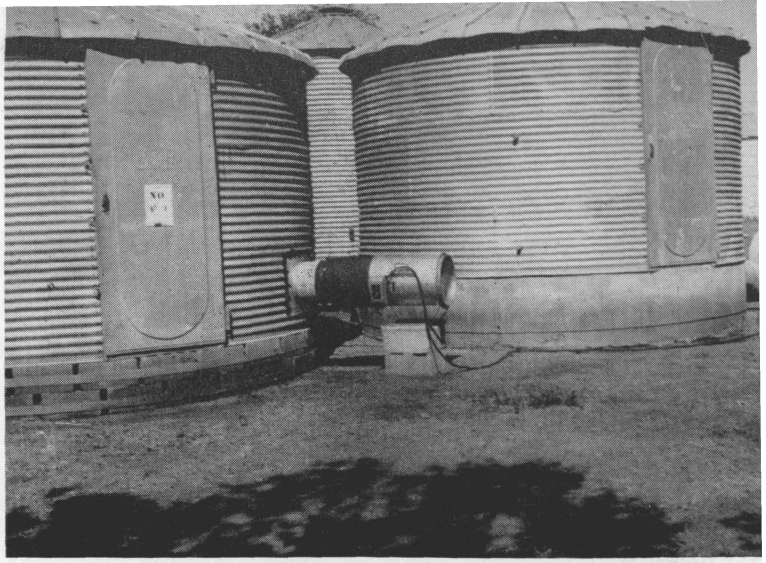


Fig. 13. Bins of this type are desirable storage and drying units for grain.

revised and kept up to date from time to time. See your county agricultural agent about this information.

Stored grain insects are a serious pest in oats, especially in humid areas, and when grain has more than 12 percent moisture. Control recommendations are given in Extension Service Leaflet, L-217 Stored Grain Insects.

HARVESTING

Most oats in Texas are harvested with a combine when the kernels are firm and hard. At this time the heads usually are drooped, the straw is darker and a small part of the crop may have shattered. Grain in storage may mold if combining occurs too early. Oats should not contain more than 13 percent moisture when they are combined and stored in bulk or losses from molding, heating and spoilage may result. It is a good practice to start combining grain in the morning after the dew has dried and stop combining before the dew gathers at night.

Farmers occasionally mow and rake the swath into a windrow or use a windrower in harvesting oats. This practice causes the oats to dry faster. The stubble is left high and the swath remains partially on top of the stubble. In this system of harvesting, a combine with a pickup attachment is used. Oats may be combined a little earlier this way and lodging and shattering largely are prevented.

Oats in Texas seldom are harvested with a binder. If this procedure is followed, the grain should be cut when it is in the hard-dough stage or when the plants have lost approximately 90 percent of their green color. At this stage, the grain may be dented with the thumbnail, but the dent soon disappears. The bundles are then shocked and threshed.

STORAGE

Oats can be stored satisfactorily at 13 percent or lower moisture content if the grain is clean and is free of excessive weeds, trash and insects. This moisture content refers to the wettest grain stored in the bin. The average moisture content for grain may be low enough for safe storage, but if some of it contains more moisture than the others, all of it may mold or heat rapidly. Dry grain absorbs moisture rapidly from green weed seed and stems. If oats are saved for seed, they should be stored with 12 percent or lower moisture.

Temperature and humidity affect the germination of oats in storage. High temperature and humidity will reduce the length of time that oats may be stored without damage to germination. In areas such as Lubbock where the relative humidity is low, oats may be stored for several years and retain a good germination. In regions such as Houston, where the humidity is high, the germination of oats in storage may drop rapidly after the first summer.

Oats in storage should be aerated to keep them cool and the moisture content relatively constant. One tenth to ¼ cubic foot per minute of air is satisfactory in most areas and can be done with a relatively small fan and motor. Additional information on drying and aeration is available from your county agricultural agent.

Approximately 1¼ cubic feet of space are required for storage of a bushel of oats and

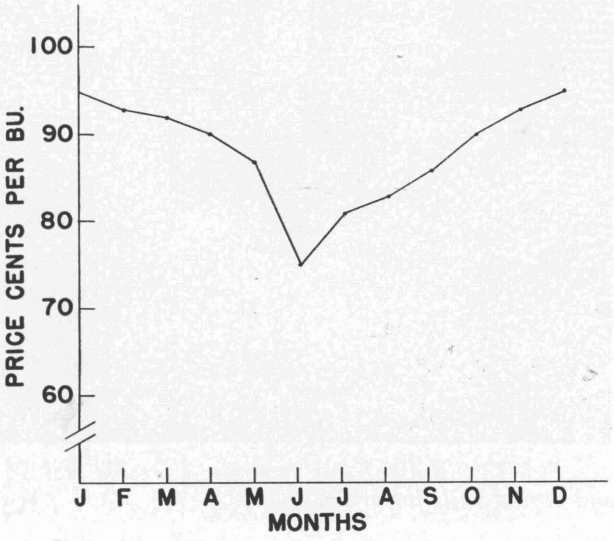


Fig. 14. Seasonal price of oats in Texas by months, 1948-55.

the number of bushels a bin will hold is equal to the number of cubic feet in the bin multiplied by eight-tenths.

MARKETING

Texas farmers receive their lowest price for oats during the harvesting season and highest price during the winter. The highest average price received by farmers for oats in December and January during 1948-1955 was 95 cents per bushel and the lowest average price was 75 cents per bushel during June. Figure 14 shows the prices received each month. Oats harvested at 15 percent moisture will lose 3.5 percent of their weight when the grain dries to 12 percent moisture.

According to the Handbook of Official Grain Standards of the United States, all grain in terminal grain markets is sold on the basis of its class and grade. This handbook gives the specifications for each class and grade. These standards require that, "Oats shall be a grain which consists of 80 percent or more of cultivated oats," and divides them into the following five classes according to their color: Class I, white oats; Class II, red oats; Class III, gray oats; Class IV, black oats; and Class V, mixed oats. Oats of each class are assigned a grade number and are sold on the basis of their class and grade number. The requirements for each grade are given in Table 4.

Table 4. Grade Requirements for the Classes of White, Red, Gray, Black and Mixed Oats

GRADE NUMBER	MINIMUM LIMITS OF: Test weight per bushel	Sound cultivated oats	MAXIMUM LIMITS OF: Heat-damaged kernels	Foreign material	Wild oats
	Pounds	Percent	Percent	Percent	Percent
1	32	97	0.1	2	2
2	30	94	.3	3	3
3	27	90	1.0	4	5
4	24	80	3.0	5	10
Sample grade	Sample grade shall include oats of any one of the classes of white, red, gray, black or mixed oats, which do not come within the requirements of any of the grades from Nos. 1 to 4 inclusive or which have other objectionable characteristics.				

Oats are sold on the market as No. 1 Red Oats, No. 2 Gray Oats, etc. In addition to having a grade number from 1 through 4 or the sample grade, each class also may be assigned a special grade such as bright oats, medium heavy oats, heavy oats, extra heavy oats, weevily oats and smutty oats. Therefore, a grain buyer in one state may buy or sell grain safely to an individual in another state without actually seeing the grain.

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